

# Gourock Pierhead, Intertidal Survey Report

Submitted to: WA Fairhurst & Partners

Dated: 24 February 2012



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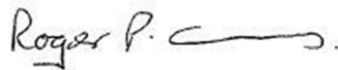
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## **1. Introduction**

Macaulay Scientific Consulting Ltd (MSC) was commissioned by WA Fairhurst & Partners (the Client) to undertake an Intertidal Survey of the foreshore area located at Gourock, Renfrewshire (Survey Area – See Figure 1) (Grid reference at foreshore centre NS241779).

The results of this survey are to be used to comply with the requirements of an Environmental Impact Assessment which has been determined as being necessary to assess the impacts associated with the proposed regeneration of the Gourock Pierhead site (Site – See Hirst Landscape Architects, Site Boundary, Drawing 1194-37, Appendix A).

This report follows on from an Ecological Walkover Survey carried out by JDC Ecology and has been used in the preparation of an Marine Ecology Chapter for the Environmental Statement.

This report is one of a number of technical reports produced as part of the Environmental Impact Assessment.

Further details pertaining to the subject site, survey area and the proposed regeneration works are included in subsequent sections.

## **2. Limitations and Constraints**

Macaulay Scientific Consulting Ltd has endeavoured to assess all information provided to them during this investigation, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at, or adjacent to the site.

There was a lack of accessible soft sediments to recover representative samples within the scope of the survey, due to the difficult ground conditions i.e. high cobble and boulder content. The survey was carried at the lowest tide within the contract window. It may be possible during lower tidal conditions that soft sediment may be available for sampling, however based on the low conservation and habitat value of the site, it is unlikely that analysis of soft sediment samples would have a significant effect on the level of impact outlined.

The transect survey results relate specifically to localities encountered along the transect. The ecological and physical characteristics of locations out with the transect, may vary slightly. However, MSC considered that the results outlined in this report provide a reasonable and reliable representation of the ecological and physical characteristics of the survey area.

## **3. Relevant Legislation and Planning Policy**

In order to undertake a comprehensive assessment, it has been necessary to take into consideration a range of International, National, Regional and Local legislation and policy,

The following have been taken into account in this review due to the potential impact of the proposed development on species (protected and un-protected), ecosystems, marine biodiversity, protected or designated habitats, and the achievement of objectives set at different governance levels for each of these. In addition, regional and local planning policy was reviewed to determine the extent to which the proposed development is in accordance

with these policies. The degree to which the listed legislation is relevant is dependent upon any conservation designations on the site.

### **3.1 International Legislation**

#### ***The Convention on Biological Diversity 1992***

The Convention on Biological Diversity focuses on the conservation of all species and ecosystems and, therefore, provides protection to all biodiversity. Contracting Parties are required to create and enforce national strategies and action plans to conserve, protect and enhance biological diversity. In accordance with this, UK Biodiversity Action Plans (BAPs) were developed. For inter-tidal and sub-tidal zones, priority habitat and species plans have been developed and are considered in the evaluation of features potentially affected by the development. The BAPs provide guidance for the conservation and management of biodiversity within the natural environment.

#### ***The Oslo Paris (OSPAR) Convention for the Protection of the Marine Environment of the North-East Atlantic***

The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. Annex V of the Convention covers all human activities that might adversely affect the biodiversity and marine ecosystems of the North-East Atlantic. Article 2 requires parties to “take necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practicable, marine areas which have already been adversely affected”. Measures and programmes include the identification of ecological quality objectives for the North Sea, development of lists of species and habitats in need of protection, identification and selection of marine protected areas, and the prevention and control of adverse impacts from human activities.

### **3.2 European Legislation**

#### ***EC Directive on the Conservation of Wild Birds (2009/147/EC) (Birds Directive)***

The Birds Directive aims to protect all wild birds, their eggs, nests and habitats within the EU. The directive recognises that habitat loss and degradation are the most serious threats to the conservation of wild birds. It therefore places great emphasis on the protection of habitats for endangered as well as migratory species (listed in Annex I), through the establishment of a coherent network of Special Protection Areas (SPAs) comprising all the most suitable territories for these species. The Conservation (Natural Habitats, &c.) Regulations 1994 in combination with the Nature Conservation (Scotland) Act 2004 implement the EU Birds and Habitats Directives in the inshore area.

#### ***EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (Habitats Directive)***

Under the Habitats Directive, Special Areas of Conservation (SACs) can be designated to maintain or restore the habitats (Annex I) and the species (Annex II) at a Favourable Conservation Status. Favourable conservation status is defined in the context of habitats as the establishment of conditions which will ensure that the extent and range of the habitat and the populations of the species within that habitat will be maintained or increased over time. In relation to species; the viability, population size and range of the species should be maintained in the long term. The Habitats Regulations 1994 (as amended in Scotland 2008a)

in combination with the Nature Conservation (Scotland) Act 2004 implement the species protection requirements of the Habitats Directive in Scotland on land and inshore waters (0-12 nautical miles).

#### ***The Water Framework Directive (2000/60EC)***

The Water Framework Directive (WFD) establishes a legal framework for the protection and improvement of, water quality and the ecological status of freshwaters and coastal waters. The WFD is, therefore, of relevance to the assessment of impacts on marine ecological receptors. The WFD provides a mechanism by which disparate regulatory controls on human activities that have the potential to impact on water quality may be managed effectively and consistently. In addition to a range of inland surface and groundwaters, the WFD covers transitional and coastal waters up to one nautical mile from the baseline (extended to three nautical miles by Scottish Government), generally mean low water.

The WFD requires that all inland and coastal waters must reach at least 'good status' by 2015 (with exception of heavily modified water) and defines how this should be achieved through the establishment of environmental objectives and ecological targets for surface waters. The WFD is implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003, which provides for new controls over activities such as abstraction, impoundment, engineering, point and diffuse source pollution which directly affect the water environment. These controls are implemented by the Controlled Activities Regulations.

#### ***EU Marine Strategy Framework Directive***

The Marine Strategy Framework Directive has an aim of "maintaining biodiversity and providing diverse and dynamic oceans and seas which are clean, healthy and productive." The directive sets out a process whereby EU member states must achieve "Good Environmental Status" by 2020. To achieve this, member states must establish environmental targets for 11 diverse environmental descriptors and the directive stresses the importance of the ecosystem approach. The MSFD is the first major instrument for the implementation of the EU's future integrated maritime policy which has been designed to achieve the full economic potential of the oceans and seas while conserving the marine environment and is therefore of relevance to the assessment of impacts on marine ecological receptors.

### **3.3 UK and Scottish Legislation**

#### ***Water Environment and Water Services (Scotland) Act (WEWS) 2003***

The WFD was transposed into Scots law in 2003 by the Water Environment and Water Services (Scotland) Act 2003. The WEWS Act created a River Basin Management Planning process to achieve environmental improvements to protect and improve the water environment in a sustainable way; and provided for regulations to control the adverse impacts of all activities likely to have an impact on the water environment.

#### ***Conservation of Habitats and Species Regulations (2010)***

The Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations) transpose the Habitats and Birds Directives into national law and make provision for the protection and management of sites, including the control of potentially damaging operations that may affect designated sites. In Scotland, the Habitats Directive is transposed through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the Conservation (Natural Habitats, &c.) Regulations 1994.

### ***Wildlife and Countryside Act 1981 (as amended)***

The Wildlife and Countryside Act consolidates and amends existing legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats and the Birds Directive. Part 1 details a large number of offences in relation to the killing and taking of wild birds, other animals and plants. The legislation applies to the terrestrial environment and inshore waters (0-12 nautical miles).

### ***Nature Conservation (Scotland) Act 2004***

The Nature Conservation (Scotland) Act 2004 places duties on public bodies in relation to the conservation of biodiversity, increases protection for Sites of Special Scientific Interest (SSSI), amends legislation on Nature Conservation Orders, and strengthens wildlife enforcement legislation. Part 3 and Schedule 6 of the Act make amendments to the Wildlife and Countryside Act 1981, strengthening the legal protection for threatened species. The species protection afforded to wild birds, animals and plants is extended to include 'reckless' acts. The protection afforded to the nests of certain, threatened, bird species is extended to all times of the year, and the disturbance of certain bird species at their lek (display and breeding) sites is prohibited.

### ***Marine (Scotland) Act 2009***

The Marine (Scotland) Act provides a framework which will help balance competing demands on Scotland's seas. It introduces a duty to protect and enhance the marine environment and includes measures to help boost economic investment and growth in areas such as marine renewables. The main measures include: marine planning; marine licensing; conservation offering improved marine nature and historic conservation with new powers to protect and manage areas of importance for marine wildlife, habitats and historic monuments; seal conservation; and enforcement.

## **3.4 National Policy**

### ***Scottish Planning Policy (SPP)***

The consolidated SPP provides a statement of national planning policy. The SPP sets out the context of planning in the coastal zone and states that "new land-based development in coastal areas should not normally be permitted where it will require significant new defences against coastal erosion or coastal flooding, unless defences are planned as part of a long term settlement strategy". It also states that "coastal areas which are likely to be suitable for development include existing settlements and substantial free standing industrial and energy developments, particularly where development is linked to regeneration or the re-use of brownfield land. These coastal areas may also contain internationally and nationally designated nature conservation sites, important cultural heritage resources and valuable areas of open space which should be protected from inappropriate development".

### ***UK Biodiversity Action Plan***

The UK BAP is the UK's response to the Convention on Biological Diversity 1992. The UK BAP describes the UK's biological resources and commits to a detailed plan for the protection of these resources. Within the BAP a list of priority species and habitats is developed, for which specific action should be taken to conserve these species and habitats. The implementation of the BAP is the responsibility of various statutory and non-statutory organisations.

### **3.5 Regional Policy**

#### ***Glasgow and the Clyde Valley Joint Structure Plan (adopted 2006)***

The Glasgow and Clyde Valley Joint Structure Plan sets out an agenda for sustained growth for a twenty-year planning and development strategy. It is based upon a vision which will contribute to the regeneration of Scotland by providing a framework for growth and regeneration based upon care for the environment. Strategic Policy 7 notes there shall be a presumption against any proposals which could have a significant adverse effect upon International, National and Strategic Environmental resources informed where necessary by an Appropriate Assessment of the proposal on the conservation interests in the area.

### **3.6 Local Policy**

#### ***Inverclyde Local Plan (adopted 2006)***

The Inverclyde Local Plan and accompanying maps set down a land-use planning and development framework designed to assist in promoting development and regeneration in the area. A principle objective of the plan is to assist in protecting and enhancing the natural environment, including the Green Belt, countryside and coast. Policy HR4 Water Quality and Environment states that proposals for development that could affect the water environment will be assessed with regard to their potential impact on: water quality and quantity; riparian habitats and wildlife; leisure and recreational facilities.

NB For relevant legislation and planning policy specifically pertaining to contaminated land and the release of leachates please refer to the Geo-environmental chapter of this Environmental Statement and the accompanying report.

## **4. Background**

### **4.1 Site location**

The site is located within Gourock town centre, to the rear of Kempock Street and extends around the area of foreshore / beach directly to the west of Gourock Railway Station (Gourock) (refer to Drawing 1194-37 in Appendix A which outlines the location of the site).

The main components of the site are two areas of car parking (the first at the railway station and the second between the buildings on the north side of Kempock Street and the Firth of Clyde). There is an area of rough, apparently previously developed land to the north of the station car park, between the car park itself and the Firth of Clyde.

The station car park is currently accessed via a junction with Shore Street, and the western car park is currently accessed via a junction with Albert Road, at the western end of Kempock Street.

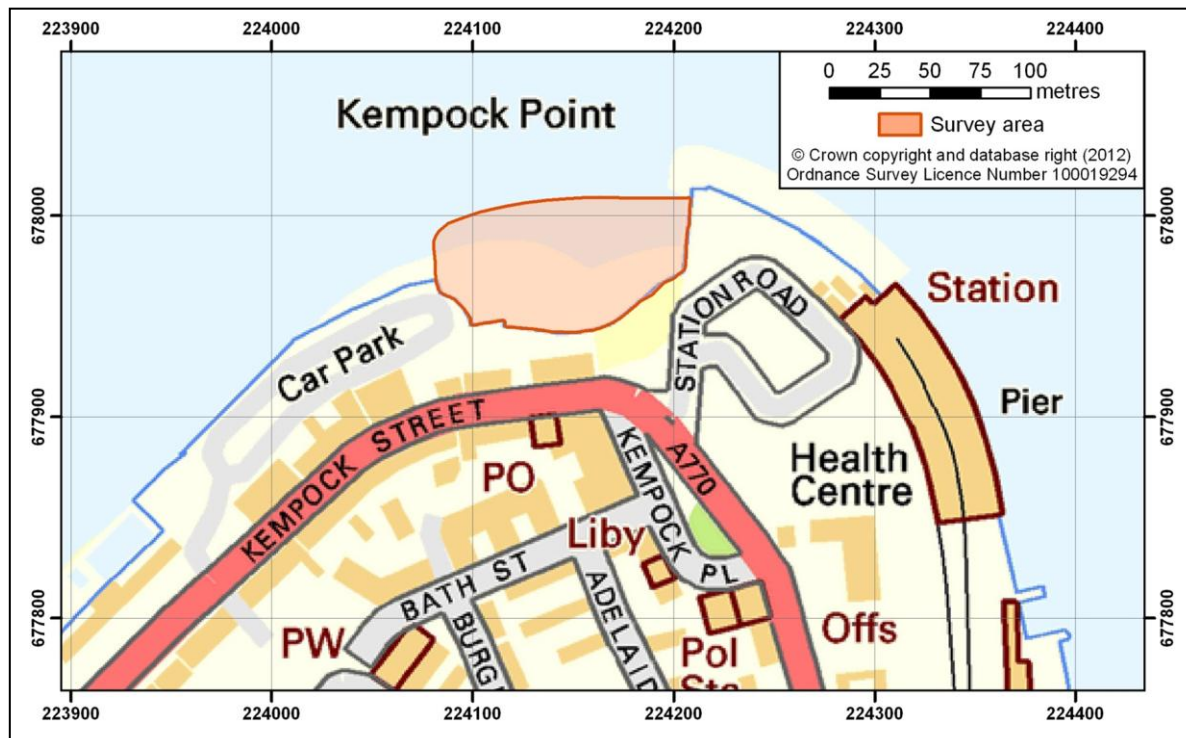
Separating these two areas is a stretch of rough ground and intertidal foreshore / beach, situated on the Firth of Clyde below buildings at the east end of Kempock Street.

There are areas of the public highway included in the site, such as along Kempock Street and the junctions which will be remodelled as part of the proposals.

The site's surroundings are a combination of established residential areas, commercial floor space along Kempock Street and the railway station. Albert Road, Kempock Street and Shore Street provide the main arterial routes to, from and through Gourock.



It should be noted, the area of land subject to the walkover and intertidal survey was limited to rough ground and intertidal foreshore / beach, situated on the Firth of Clyde below buildings at the east end of Kempock Street. From this point on, to avoid confusion, this area will be referred to as the 'Survey Area'. A plan defining the extent of the Survey Area is presented over leaf (See Figure 4.1).



**Fig. 4.1** Survey area (red shading)

## 4.2 Description of Development

The proposed development will comprise the following aspects, (and this is reflected by the application for detailed planning permission to which this Environmental Statement (ES) relates:

- Streetscape improvements along the south side of Kempock Street;
- Realigned pedestrian and vehicular access junctions to the train station and Kempock Street car parks;
- A new vehicular access junction to the station car park at the south-east edge of the site;
- Environmental improvements, soft landscaping and hard landscaping throughout the site;
- Reconfiguration of the two car parks;
- A new area of open space / public realm at the northern corner of the station car park;
- A new link road on 'reclaimed land', supported by rock revetments, across the existing beach area. This will join the two car parks, extend the Kempock Street car park and create a one way traffic movement system in the town centre; and
- A new slipway for recreational access to the sea.

The ES to which this report relates assesses the effects of both the construction and the operation / use of the proposals. With this in mind, the following information is provided at this stage in terms of the likely construction processes and operations which will be used to develop the proposals. Reference should be made to the detailed planning application which includes drawings and plans etc. of the various aspects of the proposals as detailed above.

### ***Streetscape Improvements along Kempock Street***

The streetscape improvements will largely consist of alterations to parking bays and lane delineation. This will be achieved through repainting and minor physical alterations.

### ***Realigned and New Junctions***

The realignment of junctions will be undertaken by extending and altering the existing public highway using standard road construction methods. Existing surface water arrangements will be used unless specifically noted.

The new junction at the south-east edge of the site will be used for vehicles to access the reconfigured station car park. Again, this will be constructed using standard road construction methods. Vehicles will not be able to exit the car park via this junction. Alterations to the junctions around Kempock Place will be achieved by painting the road or undertaking other minor physical alterations.

### ***Environmental Improvements and New Areas of Open Space***

Public realm / open space improvements will consist of areas of new and enhanced open space, planting, soft landscaping and hard landscaping. This includes an area of open space in the northern corner of the site at the pierhead where a 'feature' public realm area is proposed. The rearrangement of junctions will facilitate environmental improvements, especially around the junction at the south west corner of the site.

### ***Reconfiguration of the Car Parks***

It is not proposed to resurface the car parks. In order to reconfigure them, the painted layout will be altered to improve circulation and parking capacity etc. There will be new areas of landscaping and pedestrian circulation areas, especially in the station car park (to facilitate ease of movement to and from the station). Surface water drainage will not be altered significantly, and existing outfalls will be used.

### ***New Link Road and Land Reclamation etc. (To be carried out within Survey Area)***

Hirst Landscape Architects, Overall Layout, Drawing 1194-33-A shows a typical makeup of the proposed land reclamation and link road, which will connect the two car park areas and facilitate the proposed one way traffic circulation system.

At this stage, it is anticipated that material will be deposited to both exclude the sea and create a development platform before primary and secondary rock armour is placed in front of this platform to create the revetment. Geotextile material will be incorporated into the makeup of this aspect of the proposals. The platform will then be further upfilled and the proposed road (which will extend through the Kempock Street car park) built on top of this platform using standard road construction methods. This will create a road which is similar to nearby adopted public highways. Surface water from the new road and car park extension will be discharged to the sea via gulleys, and filter trenches, as appropriate. There will be no alterations to existing sea walls other than cosmetic connections and interfaces at street level. This aspect of the proposals will not extend beyond the Mean Low Water Springs level.

The general level of the extension to the car park and the new link road will be approximately 4.5m AOD. A wall of 1.2 metre in height will be incorporated into the design of the link road and the car park extension.

It is likely that rock importation will be via road, and the route will be via the public highway, onto the site via the existing station car park junction.

### ***New Slipway***

A new slipway is proposed at the eastern end of the new link road. This will allow continued access to the sea for recreational users (small boats, kayaks etc). This will be constructed in concrete and, again, will not extend beyond the Mean Low Water Springs level.

### ***Phasing***

The proposals will be constructed in one overall phase, with no significant pauses in the construction process anticipated. At this stage, it is anticipated that the final stage of the construction phase will be the construction of the junction at the station car park.

### ***Future Potential Development***

There may be future development associated with the proposals such as a marina, although planning permission is not being sought for these at this stage and the ES does not consider the environmental effects of this additional potential development. This potential future development would be subject to further statutory screening, scoping and planning requirements.

## **5. Review of Non-MSD Documents**

A review of non-MSD derived reports, made available by Fairhurst, has been undertaken, and those points deemed as being relevant to the scope of this report have been outlined below.

<b>Organisation</b>	<b>Document Type</b>	<b>Title</b>	<b>Date</b>	<b>Project Ref</b>
JDC Ecology	Report	Gourock Public Realm, Gourock Inverclyde – Phase 1 Habitat & Expert Eye Survey	March 2011	Hirst/gourock/phase1/310311
Inverclyde Council	Letter	Screening Opinion	21/06/11	SO/11/04
Fairhurst	Report	Gourock Pierhead Regeneration - EIA Scoping Report	27/07/11	87097
SEPA	Letter	Scoping Consultation Proposed Improvement Works Gourock Pierhead	19/08/11	PCS/115331
KAYA	Chapter (draft)	Water Environment	10/02/12	

Marine Scotland	Letter	Response to EIA Scoping Report	05/09/11	11/0012/Scope
Fairhurst	Report	Gourock Pierhead Regeneration Ground Investigation Interpretative Report	30/01/12	87097

## 5.1 JDC Ecology Report

JDC Ecology undertook a Phase 1 Habitat Survey on 16th March 2011 and presented the following relevant conclusions:-

*'The site is largely an area of disturbed and previously developed land, the majority of which is covered by sea-defence reinforcements, old walled structures and slipway, and dumped materials.'*

*'Ecologically the site area is relatively poor. However, this reflects primarily on the land zone and not the intertidal zone.'*

*'The record of otter sprainting on the large rocks used as sea-defences is not seen to be highly significant in relation to the otter's territorial range. From the evidence recorded it would appear that an otter(s) left the water for a short period in time. All the recorded spraints were fresh, with no evidence of sustained use of the area (signs of old spraints, food remains). Although the large rocks have some openings they do not appear to provide any good opportunities for holts or resting-up places. Again with the proximity of the road and path networks; people moving back and forth, and the potential for dogs being allowed down to the shoreline, it is unlikely that any otters would use the site on a regular basis – apart from overnight when they would be feeding in the vicinity.'*

It is understood by MSC that the impact on terrestrial ecology has been scoped out of the EIA. However, as the scope of the JDC Ecology Survey excluded a detailed examination of the intertidal zone, the additional works as outlined in this report were required.

## 5.2 Inverclyde Council Screening Opinion

Within the above correspondence, the following is stated in relation to the development proposals:-

*'This conclusion has been reached taking into account the characteristics of the development, particularly the area covered by the proposal, the nature of the development (especially the foreshore reclamation element and the potential for pollution through disturbance of previously developed ground) and its location on the coastal zone adjacent to a densely populated area. There is the potential for impact on this population and on marine ecology, the latter particularly from the foreshore reclamation, the "possible future visiting harbour", and the potential for leachate to the river from ground disturbance of previously developed land, therefore, potentially contaminated land especially around the pierhead area.'*

### **5.3 Fairhurst EIA Scoping Report**

With regard to the marine ecology, within the above report, Fairhurst state the following:-

#### ***Relevant Project Characteristics***

**Section 5.7.1** – *‘The following project characteristics have the potential to have an effect on marine habitats and species;*

- *Construction activity in the marine environment (the intertidal area in this case);*
- *Introduction of built development into the marine environment (the intertidal area in this case);*
- *Leachate, sediment and dust disturbance from construction activity in and around the marine environment;*
- *Effects of end users and future activities on marine ecology.’*

#### ***Potentially Affected Environmental Characteristics***

**Section 5.7.2** – *‘In terms of marine ecology, the above Project characteristics have the potential to have an effect on benthic species and habitats. Additionally, construction in the marine environment may alter coastal processes (refer to Section 5.8) and this must also be considered in terms of the potential effect on marine habitats and species.’*

#### ***Significance of Environmental Effects***

**Section 5.7.3** – *‘It should be noted that the aspects of the Proposals which involved development in the marine environment are in the inter-tidal area and do not extend below the Mean Low Water. Spring (MLWS) level. This should minimise the impacts of construction on the marine environment of the Proposals.’*

#### ***Construction Activities in the Marine Environment***

**Section 5.7.4** – *‘It is anticipated that the link road will be constructed by up-filling from the beach then finishing the road with tarmac etc, and placing rock in place to form the revetment. This will take place from the existing car parks initially, then from the link road as it is constructed. It is unlikely that construction plant will be located on the beach or in the intertidal area. As such, there will be minimal construction work undertaken in the marine environment, other than the placement of the rocks to form the revetment.’*

**Section 5.7.5** – *‘However, the process of building on the foreshore and placing rock to form the revetment has the potential to affect ground conditions, and may result in existing contaminants being introduced into the marine environment to the detriment of habitats and species. Fairhurst note that information contained in the Council’s Screening Opinion reflects this stance.’*

#### ***Introduction of Built Development into the Marine Environment***

**Section 5.7.6** – *‘The construction of the rock revetment has the potential to have an effect on the marine environment. The proposed revetment will partially extend into the intertidal zone, impacting on the species and habitats in this area. The Habitat Survey identifies a range of species in this area, although a systematic search was not undertaken.’*

**Section 5.7.7** – *‘However, no species of special note (i.e. protected species or other species worth drawing specific attention to in the habitat survey) were identified in this area. As such,*

*Fairhurst consider that, notwithstanding construction activity and its potential impacts on ground disturbance, the introduction of the rock revetment into the inter-tidal area will not result in any significant effects on the environment.'*

#### **Leachate, Sediment and Dust Disturbance**

**Section 5.7.8** – *'The construction activity associated with the Proposals has the potential to result in leachate, sediment and dust etc entering the marine environment. Due to the previously developed nature of much of the site, this may include silt and leachate etc which may harm the environment.'*

**Section 5.7.9** – *'This may be a significant effect, and the full extent of the ground conditions in the site and its surroundings are not yet known. A Desk Study has been undertaken by Fairhurst (June 2010) and this states that the current understanding of ground conditions is based on desk study, and should be enhanced by intrusive investigation.'*

**Section 5.7.10** – *'Although mitigation measures such as damping down stockpiles and avoiding storage of materials near water bodies will be used, there is still the potential for a significant effect on the marine environment as a result of disturbance of contaminated materials and their introduction into the marine environment.'*

#### **Effects of End Users and Future Uses**

**Section 5.7.11** – *'The activities of end users are not expected to have a significant effect on marine ecology. Drainage design will be in line with SuDS principles to avoid any significant negative effect of surface water drainage on the marine environment.'*

#### **Consultations**

Section 7.2 – *'Marine Scotland (MS) have been consulted on the Proposals to receive any relevant feedback. After a series of discussions, MS confirmed that they have no concerns regarding the Proposals (as the works do not take place below MLWS). As such, MS have determined that an EIA is not necessary under the terms of Marine Legislation.'*

### **5.4 SEPA Scoping Consultation Proposed Improvement Works Gourock Pierhead**

With regard to the marine ecology, within the above report, SEPA state the following:-

*"A baseline assessment of existing intertidal and sub-tidal habitats and species should be submitted. This should include any UK Biodiversity Action Plan habitats and species (eg maerl, sea pens, eel grass, horse mussels)." "Developers will then be able to ascertain if they are required to supplement or quantify the available data with in-field surveys."*

### **5.5 Kaya Consulting Water Environment Chapter**

A review of the Draft Water Environment Chapter (Dated: 10/02/12) produced by Kaya Consulting Ltd, provided the following information relevant to this report:-

*'Most of the stretch of urban coastline has already been developed and there are very few undeveloped intertidal areas along the Port Glasgow to Gourock coastline.'*

*'Gourock Pier has been developed since at least 1897. At this time the entire intertidal area to the west of Gourock Pier was undeveloped and the 1897 map shows a long stretch of beach extending to the west, right along Gourock's West Bay. Later map editions show the construction on the Bathing pool on this beach by at least 1914, extending out onto the beach and intertidal area. Development of West Bay continued, with Kempock Street car park area to the west of the site being constructed. Hence the site has been constrained by hard coastal defences on both sides for many years and the short section of remaining beach has essentially been isolated from long-shore sediment transport for some time.'*

*'In general given the lack of beach sediments and as many of these coastal defences have been in place for a long period of time, they have little present day influence on beach sediments along the coast.'*

*'The proposed development and reclamation of this intertidal area will have a direct and permanent impact on the coast at the site and the magnitude of the effect is assessed to be High.'*

*'As the site is of no natural heritage value or coastal resource value and is degraded at present, the overall impact in terms of coastal resource was assessed to be slight.'*

*'Any effect on coastal processes will be limited to within the site itself, as the site is not connected to the adjacent coasts. The effect of the development on adjacent shorelines and the Firth of Clyde was assessed to be Negligible.'*

*'There may be some short-term, imperceptible effect to sedimentation on adjacent shorelines during construction. It is considered that there will be no discernible effect at the Inner Clyde Estuary SSSI, SPA and RAMSAR site, the western boundary of which is 3 miles to the east of the site. The residual impact on adjacent shorelines/Firth of Clyde during construction was assessed to be of Slight significance.'*

*'Mitigation measures to reduce the amount of sediment disturbance in the near-shore area during construction works will be employed.'*

## **5.6 Marine Scotland Response**

Although it is stated in the above Scoping Report, that Marine Scotland have no concerns regarding the proposals, within the above correspondence, the following is stated:-

*'It is noted that the habitat survey was undertaken but it would have been expected that a more systematic survey would have been completed and a full list of species encountered with the document. For example, no sampling on the infauna of the soft sediments has been carried out.'*

*'It is considered that the rock revetment will have a significant effect on the environment as it will change part of the intertidal area from sand/mud/gravel to rock thus altering the benthic community in the area.'*

*'The developer should consider undertaking sediment sampling from the adjacent marine environment as part of any intrusive investigations'*

*'I agree that there is potential for a significant effect on the environment if leachate and dust are introduced into the water environment and that this should be investigated further.'*

## 5.7 Fairhurst Interpretative Report

Within the above report, the following information is considered relevant to the scope of this report:-

6 No. Trial Pits and 3 No. Boreholes and were progressed within the beach/intertidal area.

Other than the physical contents of the Made Ground, which was encountered at the surface in the majority of exploratory holes progressed within this area, and which included, basalt, sandstone, concrete, brick, wood, metal, pottery, ceramic, ash and tarmac in its contents (List is not exhaustive), no visual or olfactory evidence of contamination was noted on borehole logs.

With regard the water environment, Fairhurst state the following:-

**Section 8.2.3 Paragraph 1** - *'The Firth of Clyde surface water body is present to the north of the site. Possible pathways for contaminants to reach the Clyde are either by transport via superficial or bedrock aquifer or by surface water run-off directly into the surface water body.'*

**Section 9.0 Bullet point 4** - *'Based on the findings of the intrusive ground investigation, particularly the absence of consistent groundwater observations, it is considered unlikely that a continuous superficial aquifer is present beneath the site.'*

**Section 9.0 Bullet point 6** - *'Contaminants cannot be transported to surface water bodies via superficial or bedrock aquifer as it has been demonstrated that a continuous superficial aquifer does not exist beneath the site and because relatively impermeable glacial till above bedrock will prevent contaminants from the made ground reaching the bedrock aquifer. The potential for surface run off to transport contaminants to surface water is reduced by the introduction of hardstanding or clean cover across all parts of the development.'*

**Section 8.2.3 Paragraph 4** - *'During construction of the revetment/sea wall soil particles will be disturbed near the shoreline. This will increase the likelihood of potentially contaminated soils entering the Firth of Clyde over the construction phase. The construction Contractor should be alerted to this potential pollutant linkage in order that it be addressed in the construction phase method statement and risk assessments.'*



## 6. Intertidal Survey

An intertidal survey was conducted at the Survey Area on 30 January 2012. The aims were as follows:

- To record the habitats occurring in the intertidal zone and splash zone.
- To establish the zonation patterns of plant and animal species in these zones.
- To record the abundance of these species using standard techniques.
- To sample any soft sediments for macrofaunal animals living therein.
- To assign the habitats and species found to appropriate intertidal biotopes according to the current Joint Nature Conservation Committee classification.

### 6.1 Methodology

The site survey commenced at 09.00. Low water was predicted to be at 09.54 with a height of 0.79m above chart datum. Sea conditions were calm, allowing safe access to the lowest part of the shore exposed. Three transects from high to low water were established at three locations along the shore from west to east (See Figure 6.1). A tape measure was run down the shore at each location and GPS positions (Garmin GPS76, 7m accuracy) were logged at high water, mid-shore and low water. These transects are referred to hereafter as Western, Central and Eastern.

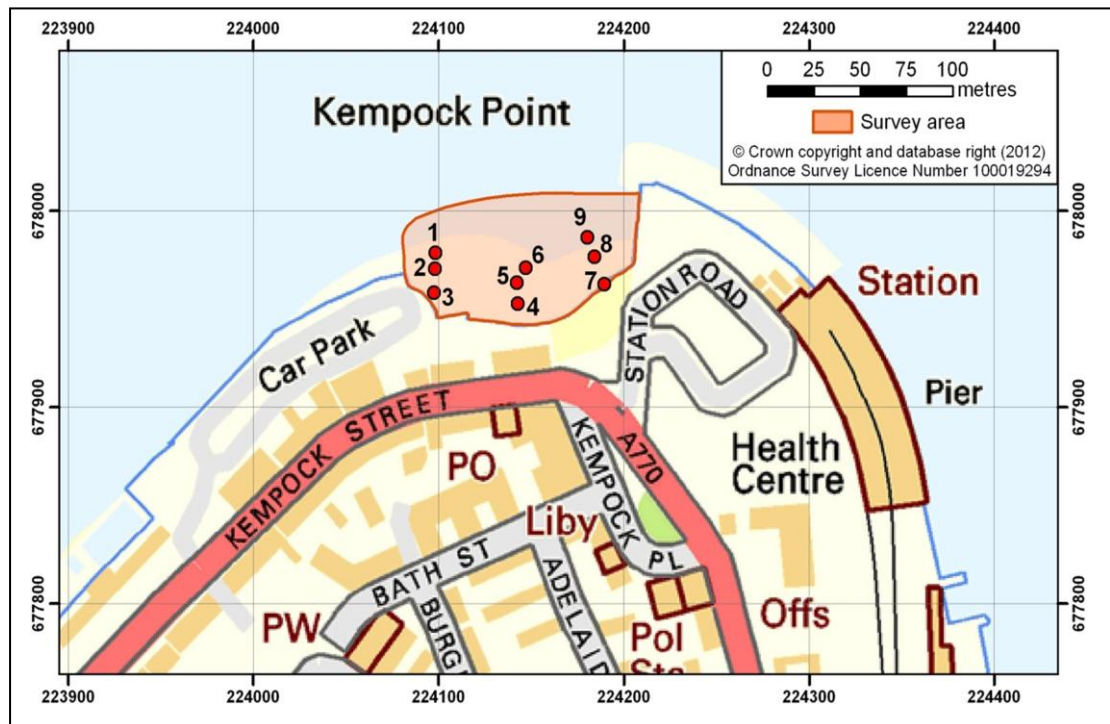


Fig. 6.1 Survey area (red shading) and transects (red points)

The flora and fauna were recorded at each of the three tidal levels (sampling stations) along each transect, giving a total of 9 sampling stations (Table 6.1). The abundance of conspicuous species was assessed using quadrats and species were assigned to abundance categories according to the scales in Hiscock (1981), with category definitions given in Table 6.2. Photographs showing the substratum, habitat types and the larger species were taken at each station. Additional close-up images of barnacles and smaller species were taken to aid identification. Samples were taken of any conspicuous species that could not be readily identified in the field. The absence of any soft sediment at low water and the difficult ground conditions obviated the need to take core samples.

Species type	Species	Transect and tidal level								
		Western			Central			Eastern		
		High	Mid	Low	High	Mid	Low	High	Mid	Low
Green alga	<i>Prasiola stipitata</i>	F			F					
Green alga	<i>Ulva sp.</i>				F					
Brown alga	<i>Fucus spiralis</i>	F			F					
Brown alga	<i>Fucus vesiculosus</i>					F				
Brown alga	<i>Pelvetia canaliculata</i>				F					
Red alga	<i>Bangia atropurpurea</i>				S					
Red alga	<i>Mastocarpus stellatus</i>		O	O		O	F			O
Red alga	<i>Osmundea hybrida</i>			R			R			
Red alga	<i>Porphyra linearis</i>				F					
Polychaete worm	<i>Pomatoceros triqueter</i>			F			F			C
Acorn barnacle	<i>Balanus crenatus</i>			C			C			C
Acorn barnacle	<i>Chthamalus montanqui</i>	O			O					
Acorn barnacle	<i>Elminius modestus</i>	F	F	F	F	F	F			F
Acorn barnacle	<i>Semibalanus balanoides</i>	C	A	A	C	A	C		F	C
Amphipod (sand hopper)	<i>Gammaridae</i>			C			C			
Gastropod mollusc (snail)	<i>Gibbula cineraria</i>						F			
Gastropod mollusc (snail)	<i>Littorina littorea</i>		C	A		A	A		O	C
Gastropod mollusc (snail)	<i>Littorina rudis</i>	C			F					
Gastropod mollusc (snail)	<i>Nucella lapillus</i>			F			F			F
Gastropod mollusc (limpet)	<i>Patella vulgata</i>	F	F	C	F	F	C			O
Gastropod mollusc (limpet)	<i>Tectura testudinalis</i>			R			R			

Gastropod mollusc	<i>Onchidoris bilamellata</i>	R		
(sea slug)				
Bryozoan (sea mat)	<i>Electra pilosa</i>	R		
Sea star	<i>Asterias rubens</i> (juvenile)		O	

**Table 6.1** Species recorded during the 30/1/2012 survey. Abbreviations: Ex, Extremely abundant; S, Super abundant; A, Abundant; C, Common; F, Frequent; O, Occasional; R, Rare. Organisms not seen during a 45-minute site visit despite searching were recorded as N, Absent.

<p>1. Barnacles</p> <p>Ex: 500 or more per 0.01 m<sup>2</sup>, 5+ per cm<sup>2</sup></p> <p>S: 300-499 per 0.01 m<sup>2</sup>, 3-4 cm<sup>2</sup></p> <p>A: 100-299 per 0.01 m<sup>2</sup>, 1-2 per cm<sup>2</sup></p> <p>C: 10-99 per 0.01 m<sup>2</sup></p> <p>F: 1-9 per 0.01 m<sup>2</sup></p> <p>O: 1-99 per m<sup>2</sup></p> <p>R: &lt;1 per m<sup>2</sup></p>	<p>2. <i>Patella</i> spp. 10 mm+, <i>Littorina littorea</i> (juveniles &amp; adults), <i>Littorina mariae</i> /<i>obtusata</i> (adults)</p> <p>Ex: 20 or more per 0.1 m<sup>2</sup></p> <p>S: 10-19 per 0.1 m<sup>2</sup></p> <p>A: 5-9 per 0.1 m<sup>2</sup></p> <p>C: 1-4 per 0.1 m<sup>2</sup></p> <p>F: 5-9 per m<sup>2</sup></p> <p>O: 1-4 per m<sup>2</sup></p> <p>R: &lt;1 per m<sup>2</sup></p>	<p>3. <i>Littorina</i> 'saxatilis', <i>Patella</i> &lt;10 mm, <i>Littorina mariae</i>/<i>obtusata</i> juv.</p> <p>Ex 50 or more per 0.1 m<sup>2</sup></p> <p>S 20-49 per 0.1 m<sup>2</sup></p> <p>A 10-19 per 0.1 m<sup>2</sup></p> <p>C 5-9 per 0.1 m<sup>2</sup></p> <p>F 1-4 per 0.1 m<sup>2</sup></p> <p>O 1-9 per m<sup>2</sup></p> <p>R Less than 1 per m<sup>2</sup></p>
<p>5. <i>Nucella lapillus</i> (&gt;3 mm), <i>Gibbula</i> spp.</p> <p>Ex: 10 or more per 0.1 m<sup>2</sup></p> <p>S: 5-9 per 0.1 m<sup>2</sup></p> <p>A: 1-4 per 0.1 m<sup>2</sup></p> <p>C: 5-9 per m<sup>2</sup>, sometimes more</p> <p>F: 1-4 per m<sup>2</sup>, locally sometimes more</p> <p>O: Less than 1 per m<sup>2</sup>, locally sometimes more</p> <p>R: Always less than 1 per m<sup>2</sup></p>	<p>6. <i>Mytilus edulis</i></p> <p>Ex: 80% or more cover</p> <p>S: 50-79% cover</p> <p>A: 20-49% cover</p> <p>C: 5-19% cover</p> <p>F: Small patches, 5%, 10+ small individuals per 0.1 m<sup>2</sup>, 1 or more large per 0.1 m<sup>2</sup></p> <p>O: 1-9 small per 0.1 m<sup>2</sup> 1-9 large per m<sup>2</sup>; no patches except small in crevices</p> <p>R: &lt;1 per m<sup>2</sup></p>	<p>7. <i>Pomatoceros</i> sp.</p> <p>A: 50 or more tubes per 0.01 m<sup>2</sup></p> <p>C: 1-49 tubes per 0.01 m<sup>2</sup></p> <p>F: 1-9 tubes per 0.1 m<sup>2</sup></p> <p>O: 1-9 tubes per m<sup>2</sup></p> <p>R: &lt;1 tube per m<sup>2</sup></p>

<p>8. Spirorbinidae</p> <p>A: 5 or more per cm<sup>2</sup> on appropriate substrata; more than 100 per 0.01 m<sup>2</sup> generally</p> <p>C: Patches of 5 or more per cm<sup>2</sup>; 1-100 per 0.1 m<sup>2</sup> generally</p> <p>F Widely scattered small groups; 1-9 per 0.1 m<sup>2</sup> generally</p> <p>O Widely scattered small groups; less than 1 per 0.1 m<sup>2</sup> generally</p> <p>R Less than 1 per m</p>	<p>9. Sponges, hydroids, bryozoa</p> <p>A: Present on 20% or more of suitable surfaces.</p> <p>C: Present on 5-19% of suitable surfaces</p> <p>F: Scattered patches; &lt;5% cover</p> <p>O: Small patch or single sprig in 0.1 m<sup>2</sup></p> <p>R: Less than 1 patch over strip; 1 small patch or sprig per 0.1 m<sup>2</sup></p>	<p>10. Lichens, lithothamnia</p> <p>Ex: More than 80% cover S 50-79% cover</p> <p>A: 20-49% cover</p> <p>C: 1-19% cover</p> <p>F: Large scattered patches</p> <p>O: Widely scattered patches all small</p> <p>R: Only 1 or 2 patches</p>
<p>11. Algae</p> <p>Ex: More than 90% cover</p> <p>S: 60-89% cover</p> <p>A: 30-59% cover</p> <p>C: 5-29% cover</p> <p>F: Less than 5% cover, zone still apparent</p> <p>O: Scattered plants, zone indistinct</p> <p>R: Only 1 or 2 plants</p>		

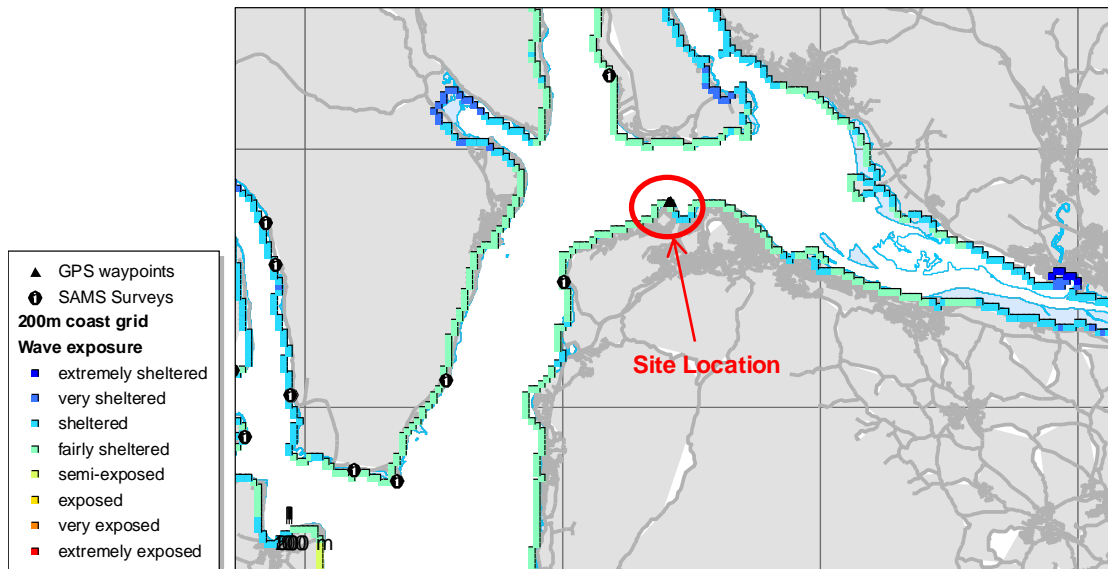
**Table 6.2.** Abundance scales used for intertidal organisms, from Hiscock (1981). Abbreviations: Ex, Extremely abundant; S, Super abundant; A, Abundant; C, Common; F, Frequent; O, Occasional; R, Rare. Organisms not seen during a 45-minute site visit despite searching were recorded as N, Absent.

## 6.2 Results

### 6.2.1 The physical environment

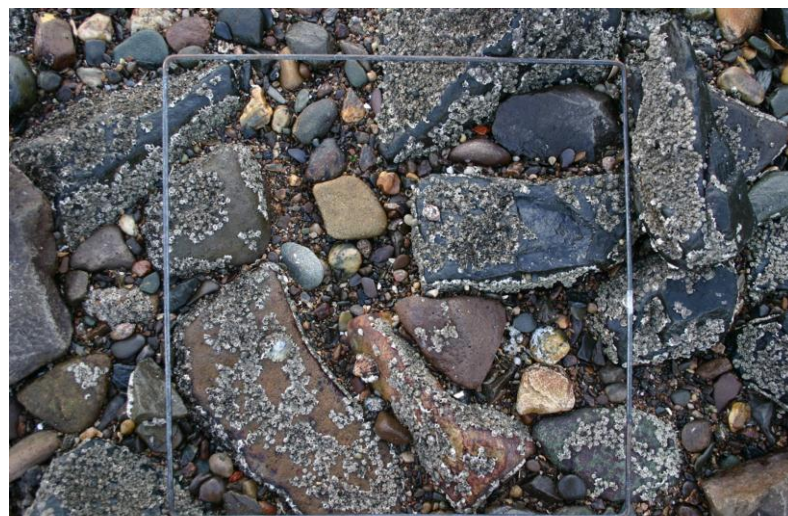
The small area of foreshore which comprises the survey area is bounded by man-made structures to west and east. In addition, the upper shore in the western half of the bay has been altered by the placing of rocks up to a metre or so across to provide coastal protection. The mid and upper shore zones at this end of the site gain some protection from the sea wall to the west, whereas the lower shore is less well protected.

Wave exposure was estimated from wave fetch calculated for a coastline model divided into 200m grid squares, and summed over sixteen 22.5° sectors and thirty two 11.25° sectors (Burrows et al., 2008, Burrows, 2012). The site values of 1.55 -1.60 for log<sub>10</sub> fetch (40km total fetch, 16 sectors) correspond to 'fairly sheltered' on Ballantine's wave exposure scale (Ballantine, 1961), in common with most of the open coasts of the inner Firth of Clyde, outside of Loch Long, Holy Loch and Gare Loch (See Figure 6.2).



**Fig. 6.2** Coastal wave exposure in the Firth of Clyde, showing the survey location (▲) and similar surveys by the project team since 2002 (e)

No bedrock was found anywhere within the survey area, the only near equivalent being the eroded concrete sea wall at the east end of the site. Most of the intertidal zone consists of angular stones up to 50cm across (Fig. 6.3) that are either loose or embedded in rock and shell gravel, along with occasional bricks and brick fragments. A number of pieces of metal debris were also seen. The stones decrease slightly in size from west to east and became increasingly mobile.



**Fig. 6.3.** Typical habitat in the mid shore on the western transect, showing barnacle-covered stones in a bed of pebbles and gravel, with a 0.5m quadrat for scale.

At low water on the east transect it was clear that many of the stones, measuring 20-30cm across, had been moved or overturned – possibly by the December 2011 storms. The upper half of this transect was of mobile shingle, pebbles and granules, that provided no stable habitat for marine life. Stranded debris of natural and man-made origin occurred at extreme high water mark on this transect. Salinity at the site is likely to be variable, given its position within the Clyde basin, but variations are unlikely to be extreme. The western and central transects extended 23.5 and 21 metres respectively from high to low water. The eastern transect extended 26 m from the strand line on a shingle ridge to the low water mark.

Trial Pit Logs from TP01, TP02, TP03 and TP05 all progressed by BAM Ritchies on behalf of Fairhurst, within the beach/intertidal area (See Fairhurst, Exploratory Hole Location plan, Ref: 87097/REP/9003) note the presence of a high cobble and boulder content from ground level (TP01, TP02, TP03 and TP05) to a depth of 0.6m bgl (TP02) – 1.7m bgl (TP05). The presence of cobbles and boulders extended into deeper strata in TP01 and TP02. TP03 and TP05 were progressed to a maximum depth of 1m bgl and 1.7m bgl respectively.

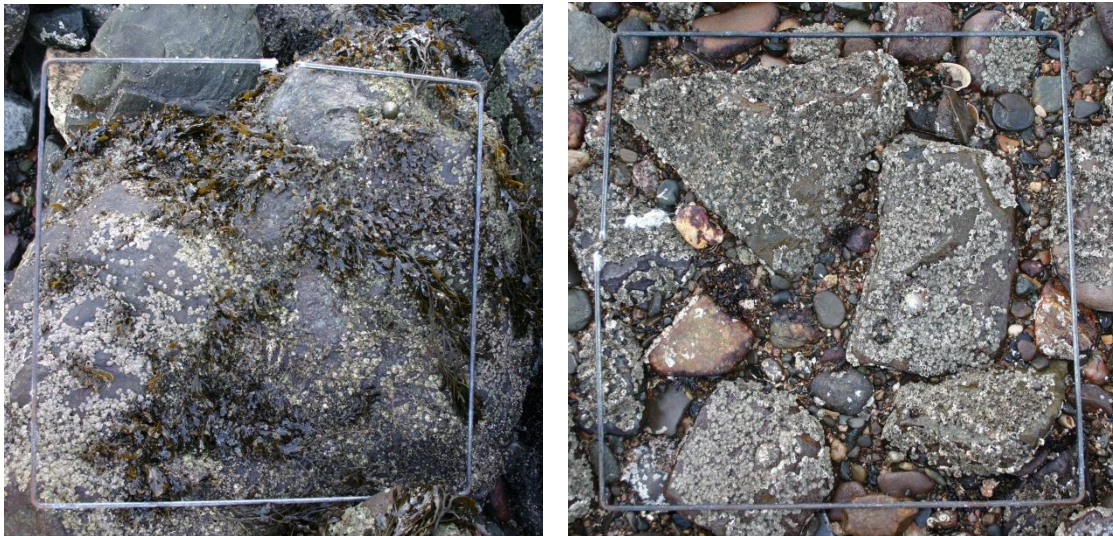
## 6.2.2 The Biological Environment

The most notable feature of the shore is the general lack of the larger algae normally present on moderately sheltered shores (Fig. 6.4 left). Only nine algal species were found and these were largely confined to the upper shore levels. Prominent among them was a distinct red zone of the red alga *Bangia fuscopurpurea* on the large boulders in the splash zone above the central transect (Fig. 4 right). This species can be especially prominent on rocky shores in winter, but largely disappears in summer. The green algae *Prasiola stipitata* and *Ulva sp.* (formerly *Enteromorpha*) also occurred at this level. Around the high water mark, the brown algae *Pelvetia canaliculata* and *Fucus spiralis* occurred in a narrow zone, the latter being more widespread (Fig. 5 left). The rough periwinkle *Littorina rudis* occurred at this level. On the mid and lower shore, acorn barnacles, especially *Semibalanus balanoides* were the most abundant animals, providing extensive cover over most of the boulders (Fig. 3). Among them were occasional specimens of the Australasian barnacle *Elminius modestus*. The edible periwinkle *Littorina littorea* was common or abundant on the lower shore on all three transects, and also prominent at mid shore level on the west and central transects. The limpet *Patella vulgata* was widespread on these two transects also (Fig. 5 right). The only other conspicuous animal species that occurred in any numbers were the dog whelk *Nucella lapillus* and the tubeworm *Pomatoceros triqueter*. The latter occurred mainly on the under surfaces of boulders, many of which had been overturned, damaging the worm tubes. Dog whelk eggs were common under the apparently more stable boulders on the west and central transects, where Amphipods of the family Gammaridae also occurred. Small to medium-sized mussels *Mytilus edulis* occurred on the concrete sea wall, along with barnacles and limpets.





**Fig. 6.4 (left)** Western transect, looking west, **(right)** Central transect high shore



**Fig. 6.5 (left)** Central transect, high shore, **(right)** Western transect, low shore

Algae on the lower shore were restricted to two red species: *Mastocarpus stellatus* and *Osmundea hybrida*. *Mastocarpus* also occurred on the mid shore on the west and central transects, especially on embedded bricks. Growth of this species can be luxuriant in the lower Clyde, e.g. at Toward Point and on the Isle of Cumbrae, but all of the plants seen in this survey were stunted.

## 7. JNCC Biotopes present

Biotopes were assigned using Version 04.05 of the JNCC Marine Habitat Classification (Connor et al., 2004). The upper shore at Gourrock is probably best characterised by either:

- LR.LLR.F.Fspi *Fucus spiralis* on moderately exposed to very sheltered upper eulittoral rock (p.74) or
- LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock (p.96).

There appears to be no biotope in the classification that includes ephemeral algae such as *Bangia fuscopurpurea*.

The mid and lower shore stations most closely match:

- LR.HLR.MusB.Sem.LitX *Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles.

## 8. Discussion of Survey Results

The survey site shows features that are typical of relatively unstable boulders on the lower and mid shore, possibly with variable salinity. Such sites are species poor, the lack of algal cover preventing the colonisation of the habitat by shade-loving species. The absence of any rock pools prevents the incursion of species that normally live below low water mark. Shores with these features are common in the Inner Clyde Basin. The most stable substrate, apart from the sea wall, is the line of large boulders high on the west and central transects. At this level, environmental conditions are relatively extreme, limiting the range of species that can colonise this habitat. Normally, the black lichen *Verrucaria maura* colonises rock and boulders at this level. Its absence suggests that the boulders have not been in place for very long.

The two intertidal biotopes identified are both widely distributed around the British coast, and have previous records from the Clyde area. All algal and invertebrate species recorded are common and widespread on British shores, and none are listed on Habitats Directive Annex II, or covered by the UK or Scottish Biodiversity Action Plans.

No marine habitats or species of conservation importance were observed.

## 9. Conclusions

The subject site is to be regenerated by:-

- Streetscape improvements along the south side of Kempock Street;
- Realigned pedestrian and vehicular access junctions to the train station and Kempock Street car parks;
- A new vehicular access junction to the station car park at the south east edge of the site;
- Environmental improvements, soft landscaping and hard landscaping throughout the site;
- Reconfiguration of the two car parks;
- A new area of open space / public realm at the northern corner of the station car park;
- A new link road on 'reclaimed land', supported by rock revetments, across the existing beach area. This will join the two car parks, extend the Kempock Street car park and create a one way traffic movement system in the town centre; and
- A new slipway for recreational access to the sea.

The survey area which is to be impacted significantly by the new link road and rock revetments currently comprises a beach/intertidal area situated within the central section of the proposed development site. Surface ground conditions at the site comprise finer sediments with a high cobble and boulder content extending to between 0.6 to 1.7m bgl. Ground conditions and the lack of soft sediments impeded the collection of representative soft sediment samples during the survey.



A habitat survey was carried out by JDC Ecology in March 2011. Based on the Fairhurst 27/07/11 Scoping Report, this habitat survey indicated that species were present in the area subject to the intertidal survey, although no species of special note (i.e. protected species or other species worth drawing specific attention to in the habitat survey) were identified within this area, and the placement of rock revetment into the intertidal area would not have a significant impact on the environment. It is understood by MSC, that the potential impact to terrestrial ecology was scoped out of the EIA.

The detailed transect survey carried out during the compilation of this report identified a number of species which are outlined in Table 1, however, no marine species of conservation importance were observed. In areas directly affected by construction of a platform and revetment existing biota will be buried or removed, but newly-constructed surfaces will be rapidly re-colonised.

MSC consider that there is the potential for a negative impact on species and habitats within the foreshore area, taking account the species poor nature of the survey area. The scope of regeneration works proposed in this area, the impact of contaminated leachates, waters, soils and dusts, which may be released during ground works on intertidal species/habitats could be mitigated against following the recommendations outlined by Fairhurst in the 30/01/12 Interpretative Ground Investigation Report:-

*'The construction Contractor should be alerted to this potential pollutant linkage in order that it be addressed in the construction phase method statement and risk assessments.'*

Based on the above, MSC considers that, although there will be a temporary localised major negative impact on the current intertidal community, within the survey area, due to the lack of any species of note, and the species poor nature of the site, the impact of the proposed development would not be considered significant.

## 10. References

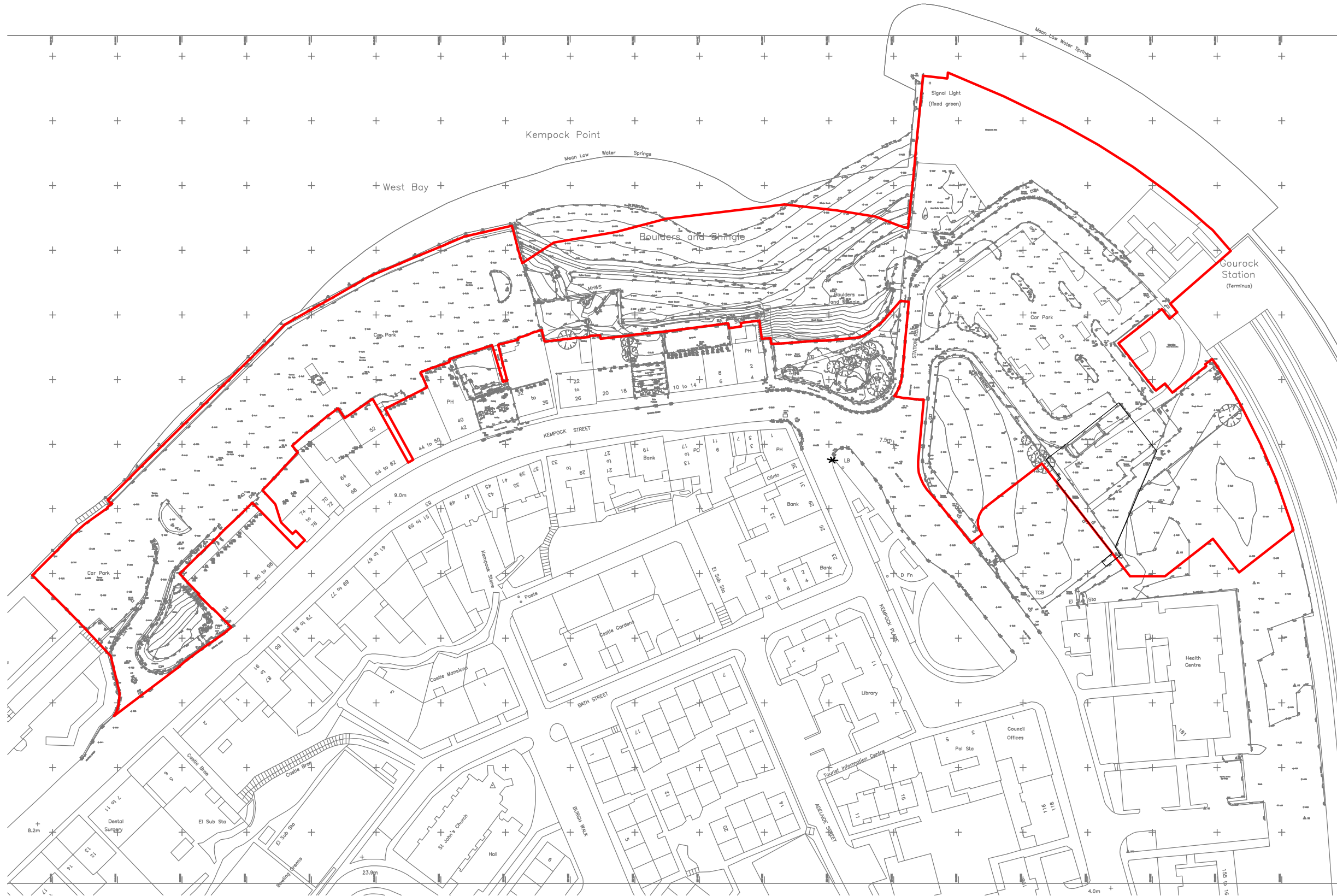
- Ballantine, W. J. (1961) A biologically-defined exposure scale for the comparative description of rocky shores. *Field Studies*, 1, 1-19.
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- Hiscock, K. (1981) The rocky shore ecology of Sullom Voe. *Proceedings of the Royal Society of Edinburgh Section B*, 80, 219-240.

# Appendices

## Appendix A – Site Drawings

**IMPORTANT**  
 The contractor will be held to have examined the site and checked all dimensions and levels before commencing construction work. Do not make assumptions - refer to the Landscape Architect. Do not scale from this drawing. If in doubt - ask!

REVISIONS



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Issue for  
**INFORMATION**

Project  
**GOUROCK WATERFRONT**

Title  
**SITE BOUNDARY**

Client  
**RIVERSIDE INVERCLYDE**

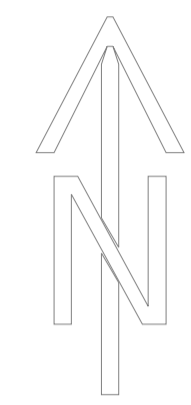
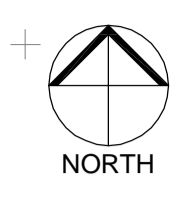
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Job No <b>1194</b>	Drawing No <b>37</b>	Revision
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**IMPORTANT**  
 The contractor will be held to have examined the site and checked all dimensions and levels before commencing construction work. Do not make assumptions - refer to the Landscape Architect. Do not scale from this drawing. If in doubt - ask!

**REVISIONS**  
 REV A 26/07/11 BM/PRM  
 DRAWING AMENDED TO REFLECT CHANGES TO RAILWAY STATION AREA AND NEW CAR PARK.



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Issue for **INFORMATION**

Project **GOUROCK WATERFRONT**

Title **OVERALL LAYOUT PLAN**

Client **RIVERSIDE INVERCLYDE**

Drawn	Checked
RCG	PRM
Scale	Date
1:500@A1	12/07/11

Job No	Drawing No	Revision
1194	33	A



## Appendix B – Site Photos



Plate 1: Survey Area looking west



Plate 2: Survey Area looking east





Plate 3: Western transect looking south



Plate 4: Central transect looking south





Plate 5: Eastern transect looking south



Plate 6: Large boulders in south-western extent of Survey Area





Plate 7: Looking north



Plate 8: North-eastern extent of Survey Area



Plate 9: Looking South from north-western extent of Survey Area